

ued use of halothane may have led to disorders of cardiac conduction and cardiac decompensation as has been reported during enflurane anesthesia in a patient with myotonic dystrophy.<sup>6</sup>

Before the final selection of a caudal as the anesthetic technique of choice, we also considered the potential risks of this procedure in this patient which included hypotension, nausea, vomiting, systemic toxic reactions to local anesthetic, high or total spinal block, and partial or complete failure to achieve an adequate block subsequently requiring supplementary anesthetic. However, when we weighed these risks against those resulting from prolonged general anesthesia, our feeling was that most of the problems with caudal anesthesia were easily preventable and manageable.

The routine use of general anesthesia for correction of skeletal deformities may be unnecessary in a majority of cases with early onset myotonic dystrophy. It is undesirable to anesthetize the entire patient, whose disease involves the muscles of respiration for an area of relatively limited surgery. Spiegel<sup>7</sup> believes that caudal anesthesia is the regional anesthesia of choice for surgery for

the abdomen, perineum and lower extremities in patients two years of age and younger. Since the myotonic syndromes involves muscles themselves and not their innervation, conduction anesthesia may not produce adequate relaxation. For this reason the use of a caudal anesthetic in pediatric patients with myotonic dystrophy should be limited to lower extremity surgery not requiring excessive muscle relaxation.

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Anesthesiology  
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## Obstruction of an Endotracheal Tube by Lidocaine Jelly

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Lidocaine jelly is frequently used as a lubricant for endotracheal intubation.<sup>1</sup> We describe a case in which an endotracheal tube was obstructed with this lubricant during laryngeal surgery. We also describe the results of a comparative study of lidocaine jelly and ointment.

#### REPORT OF A CASE

A 50-year-old woman was scheduled for microsurgical resection of a laryngeal polyp. Otherwise, preoperative examination did not reveal any significant abnormal findings. Her past history was unremarkable. One hour after administration of 0.5 mg atropine and 75 mg hydroxyzine, im, anesthesia was induced with 400 mg thiameylal and 60 mg succinylcholine, iv. A wire-reinforced anode endotracheal tube with an inflatable cuff was then inserted using lidocaine jelly as the lubricant.

After confirming that the tube was in the trachea, the cuff was inflated. Anesthesia was maintained with halothane and nitrous oxide. Surgery was performed uneventfully with the patient supine and the head extended and supported by a suspension laryngoscope. After surgery, the head was returned to the normal position. Soon after suctioning from the endotracheal tube, breath sounds became feeble by auscultation of both lung fields. Both the inspiratory and expiratory phases of ventilation were prolonged. Deflation of the endotracheal tube cuff did not alleviate the apparent airway obstruction. The endotracheal tube was then removed and replaced with a 7.0 high-volume, low-pressure endotracheal tube. The symptoms of upper respiratory tract obstruction disappeared. The patient was monitored for one hour after which the trachea was extubated with no further respiratory problems.

#### METHODS

Lidocaine jelly, 2 ml, was applied to five anode and five-low pressure, high volume endotracheal tubes. Lidocaine ointment, 2 ml, was also applied to five anode and five low-pressure, high-volume endotracheal tubes. All tubes were exposed to a flow of 60 per cent nitrous oxide and oxygen (4 liter/min).

#### RESULTS

After one hour of exposure to this gas flow, all the tubes coated with the lidocaine jelly formed the same

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sheet-like substance observed on the tube used in the patient described above. This film-like material lining the tubes peeled and clumped with flexion of the tubes causing narrowing of the lumen.

Conversely, none of the tubes coated with the ointment revealed any formation of the material observed on the tubes above even after seven hours of exposure to the gas flows.

#### DISCUSSION

Examination of the anode tube used in this case disclosed a transparent, sheet-like thin film adherent to the entire inner surface of the tube which obstructed the lumen of the tube approximately 12 to 13 cm from its tip. By qualitative analysis, the substance was found to be methylcellulose, a vehicle of lidocaine jelly; none of the chemical agents used for cleaning and sterilization of the tube was found. We hypothesized that lidocaine jelly, applied as a lubricant, might have spread over the inner surface of the anode endotracheal tube. Because of the flow of dry inspired anesthetic gases, a membra-

nous thin layer was formed inside of the tube. Post-surgical examination of the inner wall of the tube showed a shiny, scaly coating with some peeling and clumping. We believe bending of the tube during postural changes caused this thin layer to form a plug-like condition. By exposing the endotracheal tubes coated with lidocaine jelly to nitrous oxide and oxygen, we confirmed that this sheet-like substance was from the jelly.

This report serves to emphasize that lidocaine jelly should not be used as a lubricant either on the endotracheal tube or stylet. Conversely, lidocaine ointment, whose basic vehicle is polyethylene and propylene glycol, appears not to produce these problems. No conclusive data are available on the effects of various lubricants on the tracheal mucosa.<sup>2,3</sup>

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### Dose Response to Intramuscular Succinylcholine in Children

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Succinylcholine is used frequently to terminate laryngospasm or to facilitate endotracheal intubation in pediatric patients. In these situations, it is often administered intramuscularly if a patent intravenous line is not available. Although there are several studies<sup>1-4</sup> concern-

ing the effect of intramuscularly administered succinylcholine, the recommended dose of succinylcholine for children ranges from 1.5-3.0 mg/kg.<sup>5-9</sup> This study was undertaken to evaluate the neuromuscular blocking effects of intramuscularly administered succinylcholine in children utilizing muscle tension measurements and a nerve stimulator.

#### METHODS

This study was approved by the Subcommittee on Human Studies of the Committee on Research of the Massachusetts General Hospital and informed consent was obtained.

Fifty ASA Class I children scheduled for elective surgical procedures were studied. The children ranged in age from one to ten years and weighed between 7.3 and 31.5 kg. None of the children had evidence of neuromuscular disease and none were on drugs known to affect neuromuscular transmission. Premedication consisted of 20-25 mg/kg methohexital administered rectally.<sup>10</sup> After the children were asleep, anesthesia was induced by face mask and maintained with 1 to 1.5 per cent inspired

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